IFW 1703

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of
Inventor: Erik Scher et al.
Serial No.: 10/656,802 Publication No.: US 20040118448
Filing Date: September 4, 2003 Publication Date: June 24, 2004
Title: Nanostructure and Nanocomposite Based Compositions and Photovoltaic Devices

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Akua Franklin
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PROTEST BY A MEMBER OF THE PUBLIC AGAINST A PENDING APPLICATION UNDER 37 CFR § 1.291

Hon. Commissioner of Patents and Trademarks
Washington, D. C. 20231

Sir:

The undersigned herewith submits in the above identified patent application, hereinafter, the '802 application, the following items of prior art (including copies thereof) and accompanying remarks which are pertinent and applicable to the application and are believed to have a bearing on the patentability of claims 1 - 50 thereof:

US Patent Application Publication 2002/0192441A1, published December 19, 2002 to Kalkan et al. (hereinafter Kalkan)
European Patent Application EP 1087446A1 to Den, published March 28, 2001, filed September 21, 2000 (hereinafter Den).

More particularly, Kalkan and Den disclose thin films and photovoltaic devices strikingly similar to the photovoltaic of claim 1 of the '668 application, which recites a photovoltaic device, comprising: a first electrode layer; a second electrode layer; and a first photoactive layer disposed between the first and second electrode layers, wherein the photoactive layer is disposed in at least partial electrical contact with the first electrode along a first plane, and in at least partial electrical contact with the second electrode along a second plane, and wherein the photoactive layer comprises material that exhibits a type II band offset energy profile, and comprises a first population of nanostructures each having at least one elongated section oriented predominantly normal to at least the first plane.

Similarly claim 47 recites photovoltaic device, comprising: a first electrode layer; a second electrode layer; and, a first photoactive layer disposed between the first and second electrode layers, wherein the photoactive layer is disposed in at least partial electrical contact with the first

electrode along a first plane and in at least partial electrical contact with the second electrode along a second plane, wherein the photoactive layer comprises a first inorganic material and a second inorganic material different from the first inorganic material, which first and second inorganic materials exhibit a type II band offset energy profile, and wherein the photoactive layer comprises a first population of nanostructures, which nanostructures comprise the first inorganic material, the second inorganic material, or a combination thereof.

Similarly, claim 112 recites a method of producing a photovoltaic device, comprising: providing a first planar substrate having a first conductive layer disposed thereon; coating the first substrate with a photoactive matrix that exhibits a type II band offset energy profile, and comprises at least a first population of elongated semiconductor nanostructures, the nanostructures comprising a longitudinal axis, to provide a photoactive layer; orienting the semiconductor nanostructures such that their longitudinal axes are predominantly oriented normal to the first planar substrate; and laminating a second conductive layer onto the photoactive layer.

With respect to claims 1, 47 and 112, Kalkan teaches a device having first and second electrodes 10 and 14. A photoactive layer having nanoprotrusions 13 and an inter void material is disposed between the electrodes (see Fig. 1) and paragraph 0028). Fig. 1 of Kalkan shows the nanoprotrusions 13 are in at least partial electrical contact with the first electrode and the inter-void material 12 is in electrical contact with the electrode 14. Fig. 1 also shows that the nanoprotrusions 13 have elongated sections oriented predominantly normal to the substrate electrode 10. Kalkan teaches CdSe nanocrystals embedded in a matrix of a semiconductor polymer. Paragraph 0083 of the '802 application teaches that a material meeting type II band structure criterion includes a nanocrystal component and a polymer component. Thus Kalkan teaches all the features of claims 1 and 112.

Furthermore, with respect to claim 47, Kalkan clearly teaches that the void-filling material can be either organic or inorganic (see abstract, claim 12 and paragraph 0028 of Kalkan).

Claim 94 of the '802 application recites a composition comprising: a first population of nanostructures and a second population of nanostructures, which first population comprises nanostructures comprising a first material, and which second population comprises nanostructures comprising a second material different from the first material.

With respect to claim 94, in view of the preceding discussion of claim 1, it may be seen that the Kalkan's nanoprotrusions 13 may constitute a first population of nanostructures and the inter void material that fills the spaces between the nanoprotrusions may constitute a second population of nanostructures.

In addition:

With respect to claims 2 and 74 Den teaches branched nanocrystals – see Fig. 8A-8B

With respect to claim 3 and 75 Den teaches branched nanocrystals with tetrahedral symmetry – see Fig. 8B

With respect to claims 4 and 52 Kalkan teaches that the nanoprotrusions can be made of silicon which is a group IV semiconductor (see paragraph 0024).

With respect to claim 5 Kalkan teaches that a high surface area to volume film comprising a material selected from the group of: "silicon, silicon dioxide, germanium, germanium oxide, indium, gallium, cadmium, selenium, tellurium, and alloys and compounds thereof, carbon,

hydrogen, semiconductors, insulators, metals, ceramics, polymers, other inorganic material, organic material, or any combinations thereof."

With respect to claims 6, 95 and 120 Kalkan teaches CdSe nanocrystals embedded in a matrix of a semiconductor polymer (see paragraph 0038).

With respect to claim 7, 96 and 121 Kalkan teaches that the nanoprotrusions can be nanowires (see paragraphs 0024 and 0030).

With respect to claim 13, Kalkan teaches CdSe nanocrystals embedded in a matrix of a semiconductor polymer (see paragraph 0038).

The undersigned respectfully requests that the Examiner in United States Patent Application Serial No. 10/685,802 consider the above-cited items of prior art and arguments in determining the patentability of any and all claims in that application.

Respectfully submitted,

A Franklin
Signature

July 27, 2004
Date

Akua Franklin
Akua Franklin

Certificate of Service

I hereby certify on this _____ day of _____ 2004, that a true and correct copy of the foregoing " Protest by a Member of the Public Against a Pending Application " was mailed by first-class mail, postage paid, to:

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July 27, 2004
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